Decimal Multiplication

Jen Kershaw

cK-12 *f*lexbook
next generation textbooks

AUTHOR
Jen Kershaw

To access a customizable version of this book, as well as other interactive content, visit www.ck12.org

CONCEPT **1**   Decimal Multiplication

Here you'll learn to multiply decimals with and without rounding.

Kevin is new at Franklin Marsh Middle School. In his old school, Kevin had worked very hard to become the best at the long jump event in Track and Field. In fact, Kevin held the state record in his old state. Now Kevin has moved to a new state. He is feeling nervous about starting over again.

Before the first big meet, Kevin went out to the field to check out the sand pit where he will land for the long jump. Mr. Rend was outside working on raking the rectangular sand pit when Kevin arrived.

"Hello Kevin," he said. "How are you?"

"I'm great," Kevin said "But I am a little nervous. Is this pit the usual size?"

"As usual as it gets," Mr. Rend said. "The dimensions are 4.5 $m \times 4\ m$."

Kevin stopped to think for a minute. The sand pit at his old school had an area of 20 sq. m. He started to think about whether or not these two pits were the same size. While watching Mr. Rend rake, Kevin started to do the math in his head.

How about you? Can you figure this out in your head? To do it, you will need to multiply decimals. This Concept will teach you all that you need to know to help Kevin. Pay attention because you will see this problem again at the end of the Concept.

Guidance

Using addition, subtraction, and multiplication gives us flexibility in solving real-world decimal problems. We have explored decimals: rounding, adding and subtracting, estimating sums and differences, writing equations and solve

real-world problems. In this lesson, we investigate decimals and the properties that govern multiplication. Let's look at some statements that use multiplication.

Jeff made five times more per hour than Alex; Peter ran twice as many kilometers as Ellen;

Audrey collected three times as many grams of strawberries as Trey; the length is three times as long as the width.

All these scenarios describe multiplication relationships between decimals.

How do we multiply decimals to find a *product*?

Multiplying decimals is exactly like multiplying whole numbers—with one important difference.

There is a decimal point in your answer.

Follow these steps for decimal multiplication.

1. Line up the numbers on the right. Do not line up the decimal points, just the numbers.
2. Multiply each digit just like usual
3. Count the number of places after the decimal point in each original number.
4. Then, in your answer, count the same number of places from right to left and place the decimal point in the product.

Let's walk through a simple multiplication problem.

$$3.25 \times 1.2$$

$$
\begin{array}{r}
3.25 \ \rightarrow 2 \text{ decimal place} \\
\times \ \underline{1.2} \ \rightarrow 1 \text{ decimal places} \\
650 \\
+ \ \underline{3250} \\
3.900 \ \rightarrow 3 \text{ decimal places (2 decimal places in 3.25 and 1 in 1.2 = 3 decimal places)}
\end{array}
$$

In our final product or answer in a multiplication problem, we can hide the extra zeros.

Our answer is $3.25 \times 1.2 = 3.9$**.**

Sometimes, it will make sense to round decimals to a certain place before multiplying. When you do this, you apply the same rules as you used when you were adding and subtracting. The key to rounding is to be sure that you aren't looking for an exact answer. When you need an approximate answer, rounding is an excellent method of estimating.

Round the numbers to the nearest hundredth then find the product

3.748×8.095

This problem asks us to round each number to the hundredth place before multiplying.

As we have done in the past, to make the rounding steps clear, we underline the number we're rounding *to* and bold or circle the number directly to the right of it. We're rounding to the hundredth place, so we'll round to the second place to the right of the decimal place. The bolded number, the thousandths place, is the one to look at when deciding to round up or down.

$3.74\underline{}\textbf{8} \rightarrow$ rounded to the hundredth place $\rightarrow 3.75$

$8.09\underline{}\textbf{5} \rightarrow$ rounded to the hundredth place $\rightarrow 8.1$

Now that the numbers are rounded, we ignore the decimal points, align the numbers to the right, and multiply.

$$
\begin{array}{r}
3.75 \\
\times\ \ 8.1 \\
\hline
375 \\
+\ 30000 \\
\hline
30.375
\end{array}
$$

To place the decimal point in the answer after multiplying, count the decimal places in the original numbers and transfer that sum onto the answer. In this problem, 3.75 has two decimal places and 8.1 has one decimal place. So, once we have our answer, we count over three decimal places *from the right*, and place our decimal point between the 0 and the 3.

Now it's time for you to try a few on your own. Find each product.

Example A

1.23×6.7

Solution: 8.241

Example B

4.56×1.34

Solution: 6.1104

Example C

Round to the nearest tenth then multiply, 5.67×4.35

Solution: 25.08

Here is the original problem once again.

Kevin is new at Franklin Marsh Middle School. In his old school, Kevin had worked very hard to become the best at the long jump event in Track and Field. In fact, Kevin held the state record in his old state. Now Kevin has moved to a new state. He is feeling nervous about starting over again.

Before the first big meet, Kevin went out to the field to check out the sand pit where he will land for the long jump. Mr. Rend was outside working on raking the rectangular sand pit when Kevin arrived.

"Hello Kevin," he said. "How are you?"

"I'm great," Kevin said "But I am a little nervous. Is this pit the usual size?"

"As usual as it gets," Mr. Rend said. "The dimensions are 4.5 $m \times 4\ m$."

Kevin stopped to think for a minute. The sand pit at his old school had an area of 20 sq. m. He started to think about whether or not these two pits were the same size. While watching Mr. Rend rake, Kevin started to do the math in his head.

To solve this problem, we need to figure out if the two sand pits are the same size. First, we can round the dimensions to make the multiplication easier. This will give us an estimate and not an exact answer.

4.5 rounds up to 5

4 stays the same

$5 \times 4 = 20\ sq.meters$

If we rounded, the pits would be the same size. Since the dimension is 4.5 and not 5, we know that the pit is smaller than the one at Kevin's old school. We can multiply 4.5×5 and get the exact dimension of the pit.

$$
\begin{array}{r}
4.5 \\
\times\ 4 \\
\hline
18.0
\end{array}
$$

The area of the sand pit is 18 sq. meters.

Kevin thought about this for a minute. The difference wouldn't be that large. Kevin would be fine during the competition!

Vocabulary

Here are the vocabulary words in this Concept.

 Product   the answer in a multiplication problem.

 Estimation   finding an approximate answer through rounding or multiplying leading digits

Guided Practice

Here is one for you to try on your own.

Round to the nearest tenth and then multiply.

5.68×1.38

Answer

First, round each value to the nearest tenth.
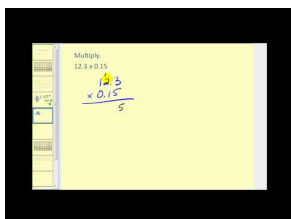
$5.68 = 5.7$

$1.38 = 1.4$

$5.7 \times 1.4 = 7.98$

This is our answer.

Video Review

Here is a video for review.

MEDIA
Click image to the left for more content.

- This is a James Sousa video onmultiplyingdecimals.

Practice

Directions: Find the products.

1. 12.7×0.8

2. 0.552×0.3

3. 6.09×3.34

4. 25.6×0.72

5. $56.71 \times .34$

6. $.45 \times 4.3$

7. 1.234×7.8

Directions: Find the product after rounding each decimal to the nearest tenth.

8. 33.076×5.228

9. 9.29×0.6521

10. 4.5513×4.874

11. 12.48×7.95

12. 14.56×4.52

13. 8.76×1.24

14. 9.123×6.789

15. 9.3323×8.719